Light and Lighting

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The Convention

THE I.E.S. Convention, to take place in London during May 14th—16th, represents a landmark in the history of the Society.

It includes a two-day Session at which a series of interesting papers will be read and an Exhibition where many interesting war-time applications of light will be illustrated.

Linked with these two main items are various social events.

But, apart from its elements, the Convention is a noteworthy event, for this is the first occasion on which the Society has attempted to stage something in the nature of a Congress—such as has been an annual event in the United States for many years.

The Convention naturally makes a strong appeal to I.E.S. members and it is hoped that all Centres and Groups will be well represented.

It also affords an unprecedented opportunity of putting the Society "on the map." Members, therefore, should make every effort to make it known amongst their friends, and especially to those whose aid and sympathy would be helpful to the Society.

A Resettlement Course in Illuminating Engineering

The efforts that have been proceeding for some time to interest the Ministry of Labour in Illuminating Engineering as a suitable subject for resettlement courses have now borne fruit. We learn with pleasure that a preliminary three months' course of this nature has recently commenced at the Borough Polytechnic (Borough-road, London, S.E.1), and that a nucleus of students, all men returning from the Forces to civil life, has been enrolled. The authorities make it easy for such men to attend these courses, fees being met and allowances paid for approved candidates. In addition, it is open to firms in the lighting industry to make arrangements for suitable members of their staff to attend, on paying the prescribed fee for the course. We certainly hope that some I.E.S. sustaining members will take advantage of this opportunity. We understand that the preliminary short course is to be followed by a longer and more complete one, probably lasting nine to ten months, which will commence in September next. Now that the ice has been broken, there seems no reason why similar courses should not be started in other localities. Meantime, those interested may be advised to get in touch with C. E. Greenslade at the Borough Polytechnic, an I.E.S. member of old standing, to whose perseverance the success in getting this initial course started is largely due.

I.E.S. Convention

Preparations for the Convention are proceeding apace. In addition to the programme which members received with the Final Notice, it is planned to furnish each member, on arrival at the President's Reception on May 14, with a special Souvenir Programme, which will serve as a worthy memento of the event, and also with a brochure reviewing the contents of the Exhibition. Summaries of the various papers will also be available, but the complete versions will only be published after the termination of the Convention as a special volume, with similar size of page, but possibly with somewhat different lay-out, to the Transactions. Cards admitting to the Sessions and to the Exhibition are available for the use of friends of members, who are asked to make every effort to bring the Convention to the notice of others likely to be interested.

The Future of Public Lighting

"Many learned bodies have inquired into the cause of road accidents. There have been Royal Commissions, Select Committees, and Departmental Committees. All have agreed on one point: that a major cause is bad street lighting." Thus commences a recent leader in the *Evening Standard*, which also recalls the view expressed, as long ago as 1928, by the Royal Commission on Transport that the present lack of uniformity and the relatively low standard of street lighting in many parts of the country cause danger to pedestrians and motorists. The Report of the M.O.T. Committee, issued in 1937, might have been quoted to similar effect. What is to be done to bring about improvement? It may well be admitted that scarcity of labour and material imposes great limitations on advances at the present moment. But it is recognised that *the real problem is largely administrative*. Although the Minister of Transport is now the Highway Authority for some 8,000 miles of trunk roads, he is not the lighting authority. The Automobile Association, surveying the Great West Road, found no fewer than 15 changes in lighting in the 16-mile stretch between Hammersmith and Slough. Such instances might be multiplied. The Committee on Road Safety recently urged the need for legislation making the control of street lighting the responsibility of one central department. Now that nationalisation in so many more difficult fields is already entered upon, may it not be suggested that this fundamental administrative problem, on which the future of street lighting so greatly depends, should at least be actively explored?

Post-War Street Lighting

Members of the Birmingham Centre had an interesting meeting on April 5, when Dr. English gave a discourse on the above subject. He discussed the main aspects of street lighting, aesthetic, economic, technical, and engineering, dealing mainly with the last named. Like other experts, Dr. English did not look for any world-shaking discoveries in this field nor any very outstanding novelties in the near future. He did, however, point out that there were some useful lessons to be learned from war-time experience during the black-out; in particular, people had managed to do with only 0.0003 ft.-c. when there was freedom from glare. Dr. English also commented at length on the recently issued draft specification which is being prepared to implement the Final Report of the M.O.T. Departmental Committee, in so doing drawing attention to some of the debatable points which he emphasised when recently opening the discussion on this topic in London. A pleasant event during the evening was the presentation, on behalf of the Centre, of a suitably inscribed morning tea-set to Mr. C. J. Allderidge, the retiring honorary secretary, as a mark of appreciation of his good services to the Centre during the past seven years.

Lighting Reconstruction Pamphlets

We are asked to remind I.E.S. members that copies of the above pamphlets (single copies 1s. each; 9s. a dozen; £3 per 100) may still be obtained on application to I.E.S. Headquarters. The sixth of the series ("Making Work Lighter") is at present out of print.

Another "Film Night"

We hear that the I.E.S. Birmingham Centre recently arranged a very successful "Film Night," which attracted one of the largest attendances ever present at meetings of this Centre. Invitations were sent to local kindred bodies as well as to students of the Central Technical College.

The Chairman, Mr. F. F. Middleton, in opening the proceedings, reminded those present that the films were designed to impress the audience rather than to entertain them. In particular it was hoped that the Film Night would serve as an introduction to the forthcoming Courses in Illuminating Engineering which are to begin at the Central Technical College on June 12.

The films, four in number, were introduced by Mr. C. F. Partridge, who is associated with the Central Technical College. The star turn of the evening was the film illustrating the importance of good lighting in industry ("Let Us See"), prepared and loaned by the American I.E.S., which a number of other Centres have had an opportunity of seeing. There were also shown, however, three other films, "Colonel Crompton: Pioneer and Prophet," dealing with the development of the dynamo, "Light Up and See," illustrating the making of electric lamps, and "Their Invisible Inheritance," prepared by the B.E.D.A., and stressing the social value of abundant electricity, more especially in homes of the future.

American I.E.S.

Proposed Changes in Constitution

It is interesting to observe that the Illuminating Engineering Society in the United States is inviting the assent of its members to the revision of its Constitution (which in aims and substance is equivalent to the Memorandum and Articles of Association of the Society in this country). It appears that in general the changes are mainly formal and textual, though attention is drawn to certain Articles in which changes in essential substance are made. One important change of this kind is that applications for admission to membership must now be endorsed in regard to "both professional and moral standing." Other changes—only in general form, however—are designed to provide an opportunity for the statement of procedure, in By-laws, of the General Board of Examiners, the Board of Fellows (a recent departure), and the General and Technical Committees. It would appear that the prescription of details is left mainly to the By-laws—procedure which is obviously also more convenient in this country, since the By-laws of our Society may be changed with the consent of members, whereas alterations in the Memorandum or Articles also require the consent of the Board of Trade.

Floodlighting During the Victory Celebrations

It is reported that floodlighting is to play a part in the victory celebrations during June 8—15. It is stated that about 35 of London's principal landmarks, including Buckingham Palace, Nelson's Column, and St. Paul's Cathedral are to be illuminated—all of them installations that figured during the 1931 I.C.I. gathering in this country as well as in subsequent festive events. It has often been urged that the provision of such lighting on special occasions should be a national obligation. Apparently this will be so during June 8—15 when, it is stated, the cost will be £25,000.

Light and Your Eyes

A Lecture to Children

Proceedings at a Joint Meeting of the Illuminating Engineering Society and the Science Masters' Association, held at the Imperial College of Science, South Kensington at 5.30 p.m. on Wednesday, April 17.

The joint meeting of the Illuminating Engineering Society and the Science Masters' Association, held at the Imperial College of Science on April 17, was reminiscent of that held just two years ago. It was equally successful, and the lecture theatre was again filled to capacity.

The event on this occasion was the giving of a specimen lecture to children entitled "Light and Your Eyes," compiled by Mr. S. S. Beggs and Mr. W. R. Stevens and delivered by the latter. In commencing his talk Mr. Stevens reminded those present that the aim was to present a lecture suitable for repetition in schools, and therefore of interest to members of the Science Masters' Association. Accordingly he proposed to address the audience in a manner adapted to young people.

The lecturer then proceeded to review progress in artificial lighting during the past 50 years—starting at a period when gas mantles and electric lamps were almost unknown. After a brief reference to ancient lamps, dating from thousands of years B.C., the lecturer passed on to modern times, recalling the Company of Tallow Chandlers, the link boys with their torches, the discovery of gas lighting by William Murdoch, and subsequently the invention of the incandescent mantle.

Electric lighting was covered in a similar manner, carbon filament lamps, tungsten filament lamps and discharge lamps being dealt with in succession, leading up to the fluorescent lamp and the effects of ultra-violet radiation, which were illustrated by a number of pleasing experiments.

In the second stage of the lecture the action of the human eye was discussed. A slide was shown to display its resemblance to a camera and familiar experiments were shown to illustrate the effects of glare, the apparent slowing down of the perception of the eye at low illuminations and the gain in perception as the illumination is increased. The latter point was well shown by means of diagrams of varying degrees of contrast, traced on a chart, some of which were only visible to the audience with the full illumination turned on, as well as by similar experiments with test types of diminishing size.

Other demonstrations showed how the appearance of objects may be altered according to the direction from which light is received and the importance of the colour of the light source when coloured objects are to be revealed in their true appearance.

A feature of the lecture was the series of experiments, 24 in number. It was explained in the course of the meeting that the full text of the lecture would appear in the Society's Transactions and would be subsequently reprinted so as to serve as a guide to those desirous of repeating it. The text will be fully illustrated and will contain, in an appendix, brief instructions in regard to apparatus and mode of presentation of the 24 experiments mentioned above.

The discussion was opened by Dr. W. D. Wright, who had again rendered helpful service in arranging matters at the Imperial College. He was followed by Mr. A. E. Mackenzie, chairman of the S.M.A., by Mr. Ennever, the present meetings secretary, and Mr. Ashton, who officiated in a similar capacity at the meeting two years ago. Amongst others who spoke it was pleasant to see once more Mr. G. H. Wilson, who had come down to London for the purpose. Mr. C. E. Greenslade (who, like Mr. Wilson, may be said to have a foot in both camps) also spoke, and Mr. Lennox made some reference to similar lectures in the North Eastern area, which have been very successfully conducted during school hours.

There was general agreement as to the effectiveness of the lecture, the care

shown in its preparation and the skill with which the various numerous experiments were "put over." It might perhaps be contended that "light" seems to receive more attention than "your eye," at least so far as experiments are concerned; perhaps, too, the range of experiments and the apparatus needed may prove somewhat beyond the resources of some schoolmasters—though here the sympathetic help of firms in the lighting industry may doubtless be counted on. When published this will be the first definite guide to lecturers, so that this is a pioneering effort. There is quite possibly room for variants adapted to children of different ages or adult audiences, the subject matter being selected according to the nature of the occasion and the aim in view.

This was the second joint meeting arranged with the Science Masters' Association, which meets for its annual conference in London every two years. We share the hope expressed by leading representatives of the S.M.A. that this joint gathering may become a biennial event—it should surely be possible to find other subjects of common interest.

Visits and Questions

Following on our recent comment on the advantages of visits and informal discussions, as a variant to the formal reading of papers, we are interested to observe that the I.E.S. Glasgow Centre has recently arranged several events on these lines. Two visits have recently taken place, to the British Luma Lamp Works at Shieldhall (where the works manager was subsequently enrolled as an I.E.S. member!) and to Messrs. Fibreglass, Ltd., at Maryhill—both in the vicinity of Glasgow. Mr. Rankin, the honorary secretary of the Glasgow Centre, writes that both events were well attended and evidently appreciated by members.

More recently the Centre has held a successful meeting entitled "Any Questions?" There was quite a representative panel to deal with these problems, the Question Master being Mr. C. A. Oakley, whilst Mr. J. A. Primrose (consulting electrical engineer), Mr. J. D. D. Shaw (electrical contractor), Dr. A. Amderson (medical practitioner), Professor M. G. Say (Heriot Watt College, Edinburgh), and Mr. S. G. Batt (lighting engineer) applied themselves to the questions, seventeen out of thirty-one posers being effectively answered.

The Evolution of Stage Lighting

(Summary of the Llewelyn B. Atkinson Lecture delivered by Mr. L. G. Applebee before the Royal Society of Arts, London, on April 15.)

The Greek Theatre is the ancestor of all theatres in modern Europe. The first indication of lighting was in connection with the dramas of Aeschylus, Sophocles, and Euripides, which were performed at certain periods of the day, the sun being the lighting unit to assist the atmosphere of the play. It was not until 465 B.C. that any backing was erected behind the actors, sometimes, a prism and sometimes a semi-circle to effect a change of scene.

Artificial Lighting

It is not until the Renaissance period, 1425-1498, that one finds further data about lighting. Thunder and lightning were simulated, squibs and fireworks occasionally used, and oil lamps occasionally placed on roof tops and towers in the scenery. About 1692 the use of oil "floatlights" (still referred to to-day as "floats") is noted, chandeliers of a sort were used in the Globe Theatre at Southwark in 1576. Mr. J. B. Fagan, in his lecture to the Illuminating Engineering Society in 1919, mentioned that he could find no further trace of progress in artificial lighting until 1674, when the second Theatre Royal, Drury Lane, was built. David Garrick introduced footlights in 1755.

Gas and Electric Lighting

Tallow candles eventually replaced primitive oil lamps, but these returned with the Argand burner. Gas was introduced at the Lyceum soon after 1803 and was developed by Sir Henry Irving, a feature being the dimming of lights (made possible for the first time) by means of valves. Limelight was not used in theatres until about 1860. In 1881 the Savoy Theatre was lighted by electricity. Thereafter, modern stage lighting developed. The arc spotlight and flood replaced the limelight. Incandescent electric lamps came to be widely used. Methods of lighting, however, remained the same until the coming of the cyclorama, envisaged by Gordon Craig and adopted by Fortuny, Rheinhart, and others. This led to a new style of scenic construction and was developed in various forms.

Projection Effects

Of great interest are projected effects, both for simulating clouds, sea waves, flames, etc., and in connection with scenery. Notable instances of projected scenery were the background of angels' wings in "Tobias and the Angel" and the distant Palace of Valhalla in "The Ring" at Covent Garden. Of technical value have been the designs of concentrated narrow beams of light from 1,000-watt lamps and the like, and greater facility in the direction of light. Perhaps one of the most important developments, however, has been in means of control. Remote control in this country has been largely initiated by Mansell and Bentham, as applied to the enormous dimmer bank at Covent Garden. A feature has been the control and combination of colour effects as exemplified in the Light Console. This formed part of the equipment furnished to the State Opera House at Lisbon during the war, where there was a gala performance in 1941 to celebrate 300 years' independence of Portugal.

As an example of the enormous connected electric loads of modern theatres, the Royal Opera House, Covent Garden, is mentioned. Its load, 850 k.w., is, however, exceeded by that of the Berlin State Opera House (1,220 k.w.), the Roxy, New York (2,500 k.w.), and, still more, the Red Army Theatre in Moscow (4,145 k.w.).

Theatre Lighting as a Synthetic Trainer for War

A very interesting recent development has been the mobilisation of theatre

lighting as a synthetic trainer for war. Apart from its conventional use on numerous stages for the entertainment of the Forces, theatrical lighting effects were applied in "synthetic training" involving the creation of conditions sufficiently realistic to accustom combatants to those which they would have to face in actual warfare.

A high degree of realism was attained in a series of courses for the instruction of service personnel in aircraft, destroyers, submarines, and M.T.B.s. A large cyclorama, 44 ft. in diameter and 20 ft. high, was constructed. The lower portion was painted to represent the sea. In the centre was a machine representing the aircraft or the bridge of the destroyer, etc., capable of being operated realistically. For instance, the bridge of a destroyer could be made to pitch and roll and to be capable of response to the helm and the assumed direction of the sea. All the motions of the bridge were transmitted to a remote recorder, so that the course of the ship was correctly plotted, and this recorder was linked to another which plotted the course of a target ship—a realistic image of which was projected in the view of the observer on the bridge. Evasive or aggressive action could thus be studied. All the while, smaller projectors gave realistic effect to the motion of the sea, passing clouds, etc. Lighting could be varied to simulate night and day effects and varied climatic conditions. At night, for instance, the target ship could be made to appear in silhouette.

Numerous other effects, such as breeze above the wind screen, the noise of the wind and sea, gunfire, etc., could be imitated. The experiences of those in training were quite realistic, and cases of sea-sickness were not unknown! Numerous other types of synthetic trainers were devised, bombardment tables, flare-dropping apparatus, visual flying trainers, crew trainers, ship recognition trainers, etc., and in almost all cases there was a considerable use of theatrical lighting to give realism.

Brightness Engineering

A very useful paper on the above subject was recently read before the Illuminating Engineering Societies of Australia by Mr. F. G. Nichols, who reviewed methods of defining and limiting brightness as proposed in American literature and elsewhere.

The author recalled the chief formulae relating to brightness which is usually expressed in candle power per unit area or lumens per unit area, though Professor Moon has suggested a more generalised concept ("Helios") to replace that of brightness.

Brightness contrast is most frequently defined in terms of the difference in brightness of an object and its background, divided by the brightness of object or background, whichever be the greater. The familiar curve relating visual acuity to brightness ratio is reproduced and the conclusion is quoted that, for prolonged critical seeing, brightness ratios (between object and background) smaller than 1 : 5 are desirable, ratios greater than 1 : 10 should be avoided if possible, and ratios greater than 100 : 1 should not be tolerated. Other limits relating to light sources are desirable in order to limit glare. For good conditions the ratio of brightness of task to surroundings and of light source to background should not exceed three.

Mr. Nichols suggests some modifications in the Australian code, in which no mention of such brightness ratios at present occurs.

Traffic Signs

Report of Ministry of Transport Departmental Committee

A committee under the chairmanship of Sir Frederick Cook, formerly Chief Engineer of the Ministry of Transport, was appointed in February, 1943, by the Minister of War Transport to "consider the system of road traffic signs and other cognate means of controlling traffic on roads and to make recommendations." The report of this committee has now been published.

In the introduction to the report now issued* acknowledgment is made to the various organisations which submitted information or gave help to the committee. Special acknowledgment is made of the valuable assistance received from the Illuminating Engineering Society in the investigation of certain aspects of the illumination of traffic signs.

A report on the same subject made in 1933 formed a natural starting point for the deliberations of the committee and it was decided that in the main the system retained or adopted on the recommendation of the 1933 committee had proved satisfactory in practice. However, having studied developments and experience gained since then, they have accordingly altered or added to the 1933 report.

This report has much in common with the final report of the M.O.T. Departmental Committee on Street Lighting, and will, no doubt, find its place on the desk of every street lighting engineer alongside the street lighting report. Appendix II, which deals with the lighting of guard posts and bollards, is, in fact, Section XII of the street lighting report.

Colour Contrast and Conspicuity

Of fundamental importance in the consideration of traffic signs is that they must be so designed and sited that they fulfil their function both by day and night. To give maximum conspicuity and legibility it has been decided that black lettering on a white ground is to be preferred to white lettering on black, red or blue grounds.

The importance of backgrounds in relation to the conspicuity of signs is stressed with the recommendation that artificial backgrounds be provided if necessary. As an example of this it is frequently necessary to erect approach direction signs in towns over narrow footpaths and against a variegated background of buildings, shops, and advertisements under which conditions the standard black and white sign may not be sufficiently conspicuous. Tests with different coloured backgrounds indicate that the best colour to be adopted is a light chrome shade of yellow. It is stressed that such backgrounds should be authorised only in towns and then only when there is provided on any of the roads entering the junction a system of street lighting with lamps not more than 200 yards apart. A different colour is recommended for surrounds to a new type of sign, which shall be known as a local approach sign. This sign, which is intended for the use of local rather than through traffic, shall, under the same conditions as the through traffic sign, be given a "traffic blue" background so that the two types of sign may be differentiated.

As the wording and symbols on signs are usually viewed by the road user for a short space of time only the layout must be as simple and concise as possible. The importance of adequate maintenance is stressed as lack of maintenance may result in serious impairment of the conspicuity and legibility of the sign, particularly as seen by artificial light. It is also important that the illuminating equipment be serviced adequately so that a reasonably uniform standard of performance may be maintained.

Brightness By Night

It is desirable for all traffic signs, and indeed necessary in the case of warning, prohibitory, and mandatory signs, for

*Report of the Departmental Committee on Traffic Signs, 1944, H.M. Stationery Office, London, 2s. net.

conspicuity and legibility to be the same by night as by day. Though not wishing to restrict the methods by which signs are adequately illuminated at night the committee found that exterior illumination was preferable to interior illumination, the reasons being better day-time performance and simplicity and ease of maintenance. This is a reversal of the opinion of the 1933 committee, which recommended internally illuminated signs, although at that time the difficulty of maintaining such signs was mentioned in the report. Signs fitted with reflecting lenses are recommended only when it is impossible to illuminate the sign by direct means.

A provisional sign brightness of from 15 to 20 equivalent foot-candles is now suggested, which, it is stated, should be adequate for well-lighted streets though not so high as to cause discomfort or glare in unlighted or poorly lighted streets. It is of interest to note that the committee recommend that, as and when standard specifications for traffic signs are prepared or revised by the British Standards Institution, consideration should be given to such questions affecting illumination as the quality of diffusing or reflecting materials and the desirable intensity and correct location of sources of light in relation to the area illuminated.

The recommendations of the M.O.T. Street Lighting Report on the lighting of posts or bollards on street refuges are endorsed with the added opinion that unless the standard of street lighting is such that the guard posts are clearly visible to traffic they should be self-luminous.

Extraneous Lighting

Another point in common with the Street Lighting Report is the opinion that uncontrolled illuminated advertising signs erected in such positions that they detract the attention of drivers from traffic signs or tend to be mistaken for traffic signs are most undesirable and that greater powers than those already in existence be given to local authorities to ensure removal of such signs.

Since the effectiveness of signs fitted with reflecting lenses depends upon their being so placed as to fall within the headlamp beam of vehicles on the road there may easily be confusion of such signs with standard traffic signs. It is considered essential, therefore, that the use of reflecting lenses or other reflecting media in advertising signs should be prohibited. Further to the subject of reflecting lenses the report states that the self-cleansing reflector studs which are set in white lines on the roads should not be used on roads where the standard of street lighting is such that headlamps are not used.

Traffic Signals and Pedestrians

The practice of layout and operation of signals being now largely standardised, the committee see no reason for introducing any major changes. It is suggested, however, that in designing traffic light signal installations the needs of pedestrian traffic should be fully considered and such provision for that traffic as is practicable should be made.

Dealing with pedestrian crossings, the committee confirms the existing beacon as the main indication to all road users of the location of a crossing, but recommends that the orange globe should be internally illuminated during the hours of darkness.

Other Lighting Aspects

Although not strictly included in the general classification of traffic signs, street name-plates are referred to in some detail, and once again it is recommended that such plates be fixed so that they can have the benefit of light from street lamps that they might be read without difficulty by drivers at night.

In the interests of public safety, the method of marking and lighting road excavations and obstructions should be uniform throughout the country. It is recommended that the maximum interval at which lamps should be placed along the length of an excavation or obstruction should be 20 ft., and that red lamps only should be used.

Mention is made of a special "Request" stop sign for use at stopping places of public service vehicles. A few of these signs have been authorised by the Minister of Transport. Some of

them incorporate an illuminated panel, which is caused to light up when the intending passenger presses a push-button.

Summary of Principal Recommendations

The following is a summary of the principal recommendations from a lighting point of view:—

COLOUR OF SIGNS.—Except in certain special cases the lettering on traffic signs should be black on a white ground.

ILLUMINATION OF SIGNS.—By night the conspicuousness and legibility of all traffic signs should approach as nearly as possible to daylight standards. Direct external illumination is to be preferred. Street tests should be undertaken to confirm that a suggested intensity of sign brightness is satisfactory under all lighting conditions.

On roads where vehicle headlamps are normally used the fitting of reflecting lenses is a satisfactory method of rendering signs conspicuous and legible by night, and they should be employed on all prohibitory, mandatory, and warning signs on unlighted roads where direct illumination is not practicable. In these cases the red disc, ring or triangle over the sign should be fitted with red reflecting lenses. Symbols on warning signs should be capable of being outlined with reflecting lenses and modifications are recommended to this end.

Standard specifications should cover points of design and construction affecting illumination efficiency, including the optical properties of reflecting lenses for use in traffic signs.

LIGHTING OF ROAD EXCAVATIONS AND OBSTRUCTIONS.—The method of *marking and lighting road excavations* and obstructions should be uniform over the whole country.

MARKING OF PEDESTRIAN CROSSING PLACES.—The orange globe on the beacon should be illuminated internally during the hours of darkness.

There are a number of appendices to the report, one of which deals with the lighting of *guard posts* and *bollards*, and has already been mentioned. Another illustrates the various types of signs considered in the report.

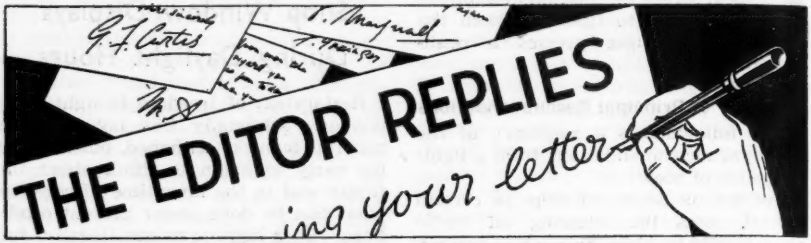
Shop Window Displays During Daylight Hours

Restoration of freedom to light show windows artificially has not been as rapid as many of us hoped, but it is not too early to begin to think about the future and in the meantime to consider what can be done under present conditions. Such lighting as can (legally) fall on the contents of windows is merely the overflow of light permitted to illuminate the interiors of shops. Let us hope that conditions will be easier before the coming of winter.

At the moment is is mainly the appearance of windows in daylight with which shopkeepers are concerned. Substitution of pictorial designs on opaque board for blitzed window glass has been effective in some cases, but should not be carried too far. We have in mind some light coloured designs bordering small glass areas which appear very brilliant in sunshine or even in full daylight and, by contrast, make it quite impossible to discern the contents of windows, at present receiving little or no artificial light.

This is evidently another instance of the "interference of daylight" recently mentioned in these columns. Yet another is the troublesome reflection in window glass of bright objects in the street. Before the war the desirability of stepping up artificial show window lighting to quite high levels, in order to obliterate such reflections and to cause the contents of windows to stand out, at least during relatively subdued daylight, was being advocated. But this, of course, is a practice quite unrealisable at present and hardly likely to be considered seriously for some time to come.

In the future, there will be many interesting developments in artificial lighting to be applied in shop windows. Amongst these are the various forms of fluorescent lighting, both low pressure and high pressure, and the special effects derived from "Black Lights" directed upon fluorescent materials, which may well play an important part in arresting attention, and for decorative effect.

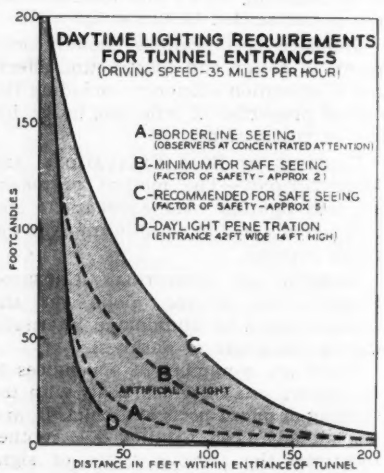


The problem of the "**interference of daylight**" when the lighting of long arches and tunnels is under consideration, raised by Mr. A. Cunnington and discussed in our last issue (p. 55), leads me to refer to a contribution entitled "Recommended Practice of Street and Highway Lighting" in "Illuminating Engineering" (Feb. 1946, p. 105). This contains an interesting chart relating to tunnel entrances, which is reproduced below.

It will be noted that very substantial illumination over at least 100 feet from the entrance to the tunnel is recommended in order to bridge over the gap between the normal artificial lighting in the centre of the tunnel and the daylight, which may attain thousands of foot-candles at the tunnel entrance. It is remarked that vehicular tunnels involve many features of design not common to streets and highways. Conventional methods and equipment may not be satisfactory. One point that certainly deserves consideration is **the colour of the light**. A colour very remote from daylight (that of sodium lamps for instance) helps to accentuate the sense of "interference" from daylight. It is much better to aim at a visual approximation to **the colour of natural lighting,** which, I believe, is done on some of the most successful installations.

I have received some comments on Mr. Winch's recent I.E.S. paper (March, pp. 41-42), and on the contribution on **the measurement of Lumen-Output from Very Large Sources,** also in our March issue (p. 43). It is asked, "Can it really be true that if one is concerned only with the measurement of lumen-output (i.e., mean spherical c.p.) from such sources as the 5 ft. fluorescent tube, the distance of the source from the photometer does not matter (provided the photometric requirements mentioned in the paper are satisfied)?"

To readers who are aware how greatly the emission of light from such a source departs from the inverse square law it may well seem incredible that



(From *Illuminating Engineering*, Feb., 1946, p. 121)

different results will not be obtained at various distances. The point to bear in mind is this: Whereas, with the light received at one particular angle, the apparent c.p. **does** vary with the distance (as we know in practice), the nature of the variation varies at different angles. In some directions from the lamp the measured c.p. may be too small, but in others too high. The distribution curve thus obtained will therefore be distorted, but **the variations cancel out,** and in the summation the true mean spherical c.p. or true lumens are determined.

Other debatable points centre round the effort to measure 5 ft. tubes in integrating spheres or boxes. Whilst possibly the remarks of the contributor in our last issue may be broadly correct, provided no great degree of accuracy is desired, it should not be assumed that such devices as those followed by Mr. Winch in this particular case are always expedient. It is, for example, **only in special circumstances** that a **reflecting power of only 50 per cent.** for the interior coating of the integrating chamber can be advised, though as a rule some diminution in reflecting power (say to 75 per cent.) is usually expedient when sources of dimensions which are large in comparison with those of the enclosing chamber are to be measured.

A member of the Australian I.E.S., on a visit to this country, is impressed by the general use of the standard 5 ft. fluorescent lamp, available for use at normal supply voltages, and the absence of **high voltage tubular systems,** such as are usual in the United States, and to some extent in Australia.

It need not be assumed that this country is behind in this field. High voltage tubular systems were coming into use before the war; for example they were introduced for the lighting of platforms on certain railway stations and in the form of **"three-colour lighting"** were being adopted in stores, where some examples are still to be seen. During the war, however, the efforts of lamp manufacturers were necessarily concentrated on the development of the standard fluorescent lamp, for which there was such a great industrial demand, and it was not possible to develop simultaneously other systems of lighting. When normal conditions return it is probable that both systems, high and low voltage lighting, will develop side by side.

I have had some inquiries addressed to me in regard to the question of the use of **yellow screens for motor-car headlights,** briefly mentioned in our January issue. My impression is that the researches conducted by Dr. Stiles at the N.P.L. before the war led to the definite conclusion that in general there is no material advantage to be gained, in fog, by inserting any kind of colour screens. Whilst certain claims may be advanced for yellow light (better fog penetration, less "scattering effect" in mist, etc.), it would seem that any such advantage is not great and is offset by the fact that the introduction of screens of sufficiently deep coloration to have any appreciable influence necessarily involves a considerable loss of light.

I have been asked once more to mention **Suitable Textbooks** for those commencing the study of illuminating engineering. Familiar treatises are the Symposium on Illumination, Elementary Principles of Lighting and Photometry, by Dr. J. M. T. Walsh, and Elements of Illuminating Engineering, by A. P. Trotter. These are excellent, but are not all easy to obtain. It is good news that another textbook on the subject by Dr. Walsh, specially adapted to the needs of students, is now in course of preparation.

Engineering Applications of Polarised Light

The seventh meeting of the I.E.S. Huddersfield Group was held on Tuesday April 2, 1946, in the Technical College, Queen-street South, Huddersfield. The lecturer was Dr. J. Ward, head of the Engineering Department (Mechanical) at the Technical College, who took for his subject "Engineering Applications of Polarised Light." The subject, whilst somewhat remote from general lighting problems, proved, nevertheless, to be very interesting to the audience.

Dr. Ward showed how polarised light could be applied to the detection of stresses in numerous examples occurring in engineering. For instance a spanner made of celluloid projected on the screen showed the stresses by a change in colour at the point of stress, when it was projected by means of polarised light, and when the stress applied was in the correct manner for turning a nut. Many other examples of stress detection were demonstrated by this method using a transparent screen and by means of lantern slides, which greatly interested the audience. Mr. E. Lunn, the Group Chairman, occupied the chair. A vote of thanks to the lecturer was proposed by Mr. J. T. Thornton. There were present 34 members and visitors.

The Photographic Representation of Street Lighting Installations

We notice with interest that the paper on the above subject by Mr. R. G. Hopkinson, read some years ago at a joint meeting of the Illuminating Engineering Society and the Royal Photographic Society in London (see Trans. Illum. Eng. Soc. (London), Vol. I, p. 19), has recently been reprinted in "Illuminating Engineering," the official journal of the American I.E.S. This paper was in the nature of a classic and set out in considerable detail the precautions that must be taken in order that satisfactory and consistent results may be achieved in this difficult field.

Personal Notes

It is stated that the new show initiated at the Saville Theatre, London ("Here Come the Boys") is to utilise the new lighting system "Delicolour," which enables over 50 different shades of coloured light, based on the mixture of three basic colours, blue, red and green with white, to be available. The system is highly compact and convenient to control. It is also to be used very shortly in new shows in New York. The system is the invention of Mr. R. Gillespie Williams, an I.E.S. member of long standing, and the present Chairman of the Nottingham Centre.

We learn with interest that Mr. J. G. Holmes, a past chairman of the I.E.S. Birmingham Centre, who has been associated with Messrs. Chance Bros. and Co., Ltd., is now transferring himself to London, where he has accepted a position with Holophane, Ltd.

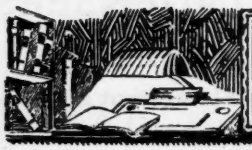
Mr. B. Gowshall informs us that he has severed his connection with the firm with which his name is associated, but expects to be re-entering the same field in the near future.

The General Electric Company, Ltd., announces the appointment of Mr. A. E. Page as Sales Manager, Osram Lamp Department. Mr. Page joined the G.E.C. in 1915, and has since been associated with the Osram Department. After several years' training at Head Office he spent a number of years travelling in London and the provinces as a Lamp Specialist. In 1926 he rejoined the inside staff, and subsequently amongst other duties represented the company on various E.L.M.A. Committees.

Mr. A. E. Page

He was appointed Assistant Manager of the Department in 1930.

Mr. Page has been a member of the I.E.S. since 1929.



REVIEWS OF BOOKS AND PUBLICATIONS RECEIVED

Electric Discharge Lamps. By H. Cotton, M.B.E., D.Sc., M.I.E.E. (Chapman and Hall, Ltd., London, 1946, *pp.* 435; *figs.* 215. *Price* 36*s. net.*)

Professor Cotton's book is welcome. It is somewhat different in scope from those recently published on the subject of discharge lamps, in that it deals mainly with underlying principles and with the phenomena associated with such sources, rather than with practical applications. It is also considerably wider in scope than are most available books dealing with fluorescent lighting; indeed the standard 80 watt 5 ft. fluorescent lamp, whilst described in Chapter IX. (Practical Forms of Discharge Lamps) is not mentioned specifically in the initial summary of this chapter, nor in the index at the end of the book. Of the 433 pages rather less than half deal with introductory matter and with the scientific background of discharge lamps. It is here that the author meets a definite need. His treatment is up to date, and the analysis in some respects goes beyond what is ordinarily found in the treatment of this subject.

The first two chapters dealing with radiation and temperature radiation follow fairly familiar lines. In Chapters III., IV., and V., dealing respectively with the structure of the atom, thermionic emission and motions of electrons and gas particles, the treatment is instructive and in parts novel and is illustrated by many helpful diagrams. Chapter VI. (atomic spectra) is again noteworthy for the illustrations, notably the double page plate between pages 96 and 97 depicting typical spectra of illuminants. The same applies to the treatment of discharge phenomena. The section on fluorescence again dips more deeply into theory and gives the student some picture of the origin of these fascinating phenomena. We now come to Chapters X. and XI., which deal more directly with discharge lamps. Methods of control are explained and illustrated, and there is a good review of typical lamps, including not only familiar mercury and sodium lamps but the latest super high pressure varieties. The final chapter on Colour is in part scientific and in part popular. In discussing "Seeing by Coloured Light" the author deals in part with psychological impressions, showing a bent towards warmer coloration of light, at least in the home where only moderate illumination is likely to be afforded, and in part with some physiological factors (such as the effect on the appearance of objects illuminated by line spectra of the chromatic aberration of the human eye). The book is agreeably printed and contains many good illustrations.

The "Gas Journal" Calendar and Directory (Walter King, Ltd., London, 1946; *pp.* 244, xxxii.)

Once more this welcome directory makes its appearance. Readers will recall that it is divided into three sections, the directory, the handbook, and the final trade sections. The directory contains a comprehensive list of gas undertakings, in this country and in the British Colonies and Dominions, and various other data including a list of public lighting engineers—a unique item and a very useful one. The handbook contains statistics relating to the gas industry, notes on gas legislation, and contributions on many sections of gas engineering.